

rewritten in independent form including all of the limitations of the base claim and all intervening claims.

Upon entry of this Amendment, claim 14 will be cancelled and claims 1-13, 15, and 16 will be amended to even more particularly point out and distinctly claim Applicants' invention. No new matter is being added.

Reconsideration and allowance of the application respectfully are requested.

### **Claim Rejections**

#### Rejection Under 35 U.S.C. §102(b) and 35 U.S.C. §103(a)

- (a) Response to Rejection of Claims 1-14 and 16-19 as being anticipated by or in the alternative obvious over U.S. Patent No. 5,292,811 to Murata et al.

In response to the rejection of claims 1-14 and 16-19 as being anticipated by, or in the alternative, obvious over U.S. Patent No. 5,292,811 to Murata et al ("Murata"), Applicants traverse the rejection and respectfully submit that the cited reference does not teach or suggest all the elements of the claims, and that a *prima facie* case of obviousness has not been made out.

In one embodiment of the present invention, claim 1 recites a process for increasing the melt strength and/or the extensional melt viscosity of a polypropylene (co)polymer comprising melt mixing a polypropylene (co)polymer in the presence of a specified initiator and optionally a monoene monomer, wherein the melt strength and/or the extensional melt viscosity of the polypropylene (co)polymer is increased during the melt mixing step. In another embodiment, claim 19 recites a process for modifying an  $\alpha$ -olefin polymer wherein the process comprises melt mixing the  $\alpha$ -olefin polymer in the presence of a specified initiator and optionally a monoene

monomer present in an amount of monomer from 0 to 3 times the total moles of initiator. In a third embodiment, claim 20 recites a process for increasing the melt strength and/or the extensional melt viscosity of a polypropylene (co)polymer comprising melt mixing a polypropylene (co)polymer in the presence of a specified initiator and styrene, where the melt strength and/or the extensional melt viscosity of the polypropylene (co)polymer is increased during the melt mixing step.

In the process of the present invention, the improved properties of the polymer are derived during the melt mixing step, so that no additional process steps are required. Appropriate selection of the initiator according to the invention produces a polymer having the desired improved properties, because these initiators show less specificity for the abstraction of tertiary hydrogen atoms from the polymer chains, compared with secondary or primary hydrogen atoms. When a monomer is used in combination with the initiator, and the monomer reacts with the initial polymer chain radical to form an intermediate grafted monomer radical, improved properties of the polymer can be obtained during melt mixing, when the intermediate grafted monomer radical undergoes radical combination in preference to disproportionation or hydrogen abstraction.

In contrast, Murata does not teach an increase in the polypropylene's melt strength. The reference discloses an increase in the MFR's of the crosslinked copolymers, relative to the MFR's of the non-crosslinked copolymers (see tables 1 and 2), which is indicative of there being no increase in the melt strength of the crosslinked copolymers. In fact, the increase in the MFR indicates that there is a net decrease in the melt strength of the crosslinked copolymers, possibly resulting from competing chain scission reactions that reduce the molecular weight of the crosslinked polymers. This is consistent with the fact that the crosslinked polymers disclosed in

Murata are recommended for use in injection molding applications (col. 20, line 19-24), which are not typically suited for use with high melt strength polypropylene. Further, with respect to the disclosed list of peroxides suitable for use as crosslinking agents (col. 18, line 19-29), many of the listed peroxides are well known in the art to promote chain scission rather than crosslinking. In particular, dicumyl peroxide (DCP) and 2,5-dimethyl-2,5-bis(tert-butylperoxy) hexane (DHBP) are commonly used in the art to reduce the molecular weight of polypropylene. Both DCP and DHBP are in fact used in at least comparative examples CE-48 and CE-57 of the present application to demonstrate this point, where the reduction in the polypropylene's molecular weight is reflected in the increase in the polymers MFI. Finally, the present application exemplifies the use of an initiator alone or with a monoene monomer to promote an increase in the melt strength of polypropylene. However, Murata fails to exemplify the use of any peroxide alone to promote crosslinking of polypropylene.

The present application also discloses the use of a peroxide in conjunction with a monoene monomer. As discussed above, the melt mixing process defined by the present application results in an increase in the melt strength of polypropylene, which in turn is typically reflected by a decrease in the polypropylene's MFR. Such a corresponding decrease in the polypropylene's MFR is consistent with an overall net increase in the molecular weight of the polymer, and occurs regardless of whether a monoene monomer is used in conjunction with the peroxide or not, as demonstrated in examples 19 to 26. Although Murata discloses the use of an unsaturated monomer as a crosslinking auxiliary in conjunction with a peroxide to promote crosslinking, only the use of a diene compound (divinylbenzene) is exemplified. Comparison of MFR values at column 25, line 41 and Table 3 of Murata clearly demonstrates that the MFR of the resulting crosslinked copolymer has increased from 3.9 to 15, thereby indicating that the



BPO/divinylbenzene combination does not result in an increase in the melt strength of the crosslinked copolymer. Further, a number of the comparative examples in the present specification utilize peroxide/crosslinking auxiliary combinations similar to those disclosed in Murata. These demonstrate a net decrease in the molecular weight of the polymers, which is also reflected in an increase in the polymers MFR; e.g., CE-6 to CE-8 and CE-12 to CE-14 where polypropylene is melt mixed with DHBP/styrene and DCP/styrene combinations, respectively.

Applicants respectfully submit that the reference, therefore, does not teach all the elements of the claims.

With respect to the obviousness rejection under §103, in order to establish a *prima facie* case of obviousness under § 103 based upon a single reference, the Examiner must establish all three of the following essential criteria: (1) the cited reference must teach or suggest each of the claimed elements; (2) there must be a motivation in the cited prior art to modify the reference as suggested by the Examiner; and (3) the cited reference must provide a basis for a reasonable expectation for success. The motivation to combine and the reasonable expectation for success must come from the cited prior art and not the Applicants' specification. Further, it is not enough that a reference can be modified absent a suggestion in the cited prior art to undertake such modification.

As discussed above, Murata does not teach that the melt strength of the described polymers increases, and therefore does not teach all the elements of the claims of the present invention. In fact, the increase in MFR of the examples of the reference clearly teaches away from the requirement that the melt strength increase. Finally, since the examples of the reference teach an increase in MFR, which infers a lower molecular weight and melt strength, there would be no reasonable expectation of success to modify the reference as suggested by the Examiner.



Applicants therefore submit that all the elements of the claims of the present invention are not

disclosed by the reference and that a *prima facie* case of obviousness has not been made out.

Reconsideration and withdrawal of the rejection respectfully is requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version With Markings to Show Changes Made."

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Should the Examiner have questions or comments regarding this application or this amendment, Applicants' attorney would welcome the opportunity to discuss the case with the Examiner.

A handwritten signature in black ink, consisting of a stylized, cursive letter 'P' or similar character.

The Commissioner is hereby authorized to charge U.S. PTO Deposit Account 08-2336 in the amount of any fee required for consideration of this amendment.

This is intended to be a complete response to the Office Action mailed November 18, 2002.

Respectfully submitted,

**GARY PEETERS ET AL.**

April 3, 2003  
(Date)

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I hereby certify that this correspondence is being deposited with sufficient postage thereon with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231 on April 4, 2003.

John A. Dutton  
April 4, 2003  
Date of Signature

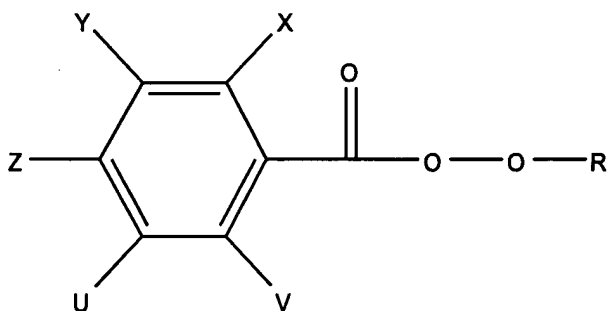
VERSION WITH MARKINGS TO SHOW CHANGES MADE

Filed on April 4, 2003

In the Claims

Claims 1-13, 15, and 16 have been changed by deleting the characters in brackets and adding the underlined material, as reported below. Claim 14 has been cancelled. For the Examiner's convenience, even the unchanged claims have been reported in the following.

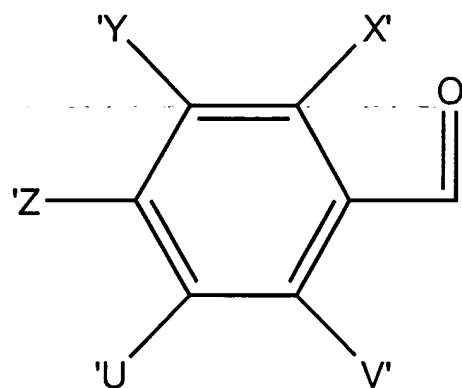
1. (Twice Amended) A process for increasing the melt strength and/or the extensional melt viscosity of a polypropylene (co)polymer, the process comprising melt mixing a polypropylene (co)polymer in the presence of an initiator and optionally a monoene monomer wherein said initiator is selected from the group defined by formula 1:



Formula 1

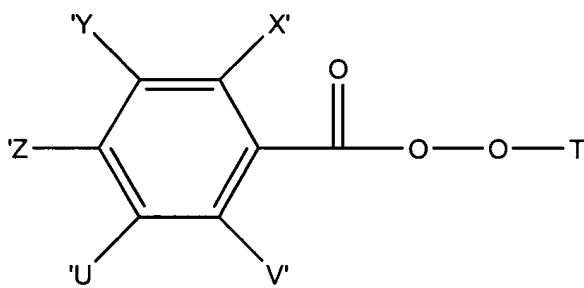
wherein R is selected from the group consisting of optionally substituted C<sub>1</sub> to C<sub>18</sub> acyl, optionally substituted C<sub>1</sub> to C<sub>18</sub> alkyl, aryl defined by formula 2,

b



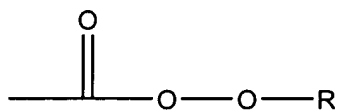
**Formula 2**

and groups of formula 3,



**Formula 3**

wherein U, V, X, Y, Z, U', V', X', Y' and Z' are independently selected from the group consisting hydrogen, halogen, C1-C18 alkyl, C1-C18 alkoxy, aryloxy, acyl, acyloxy, aryl, carboxy, alkoxycarbonyl, aryloxycarbonyl, trialkyl silyl, hydroxy, or a moiety of formula 4,



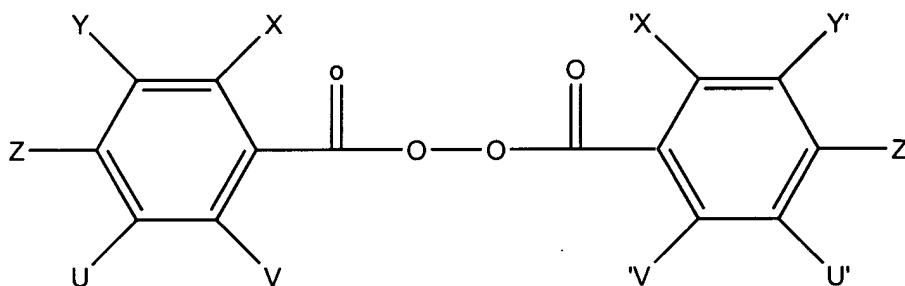
**Formula 4**

and wherein T is alkylene;

wherein the melt strength and/or the extensional melt viscosity of the polypropylene (co)polymer is increased during the melt mixing step.



2. (Amended) [A]The process according to claim 1 wherein the initiator is selected from compounds of formula 6.



**Formula 6**

where X, Y, Z, U, V, X', Y', Z', U', V' are independently selected from the group consisting of hydrogen and C<sub>1</sub> - C<sub>18</sub> alkyl where at least one of X, Y, Z, U, V and X', Y', Z', U', V' are not hydrogen.

3. (Amended) [A]The process according to claim 2 wherein the initiator is selected from the group consisting of Dibenzoyl peroxide, o,o'-Bis(methylbenzoyl) peroxide, p,p'-Bis(methylbenzoyl) peroxide, M,M'-Bis(methylbenzoyl) peroxide, o,m'-Bis(methylbenzoyl) peroxide, o,p'-Bis(methylbenzoyl) peroxide, m,p'-Bis(methylbenzoyl) peroxide, Bis(ethylbenzoyl) peroxide (all isomers), Bis(propylbenzoyl) peroxide (all isomers), Bis(butylbenzoyl) peroxide (all isomers), Bis(pentylbenzoyl) peroxide (all isomers), Bis(hexylbenzoyl) peroxide (all isomers), Bis(heptylbenzoyl) peroxide (all isomers), Bis(octylbenzoyl) peroxide (all isomers), Bis(nonylbenzoyl) peroxide (all isomers), Bis(methoxybenzoyl) peroxide (all isomers), Bis(ethoxybenzoyl) peroxide (all isomers),

Bis(propoxybenzoyl) peroxide (all isomers), Bis(butoxybenzoyl) peroxide (all isomers),  
Bis(pentoxybenzoyl) peroxide (all isomers), Bis(hexyloxybenzoyl) peroxide (all isomers),  
Bis(heptyloxybenzoyl) peroxide (all isomers), Bis(octyloxybenzoyl) peroxide (all isomers),  
Bis(nonyloxybenzoyl) peroxide (all isomers), Bis(chlorobenzoyl) peroxide (all isomers),  
Bis(fluorobenzoyl) peroxide (all isomers), Bis(bromobenzoyl) peroxide (all isomers),  
Bis(dimethylbenzoyl) peroxide (all isomers), Bis(trimethylbenzoyl) peroxide (all isomers),  
Bis(tert-butylbenzoyl) peroxide (all isomers), Bis(di-tert-butylbenzoyl) peroxide (all isomers),  
Bis(tert-butoxybenzoyl) peroxide (all isomers), Bis(ditrimethylsilylbenzoyl) peroxide (all  
isomers), Bis(heptafluoropropylbenzoyl) peroxide (all isomers), Bis(2,6-dimethyl-4-  
trimethylsilyl benzoyl) peroxide and isomers, 2,2'(dioxydicarbonyl) bis - Benzoic acid dibutyl  
ester where the term "all isomers" refers to any variation in the position of the ring substituent as  
well as the structure of the substituent itself[ i.e. for propyl; n-propyl and isopropyl].

4. (Twice Amended) [A] The process according to claim 1 wherein the initiator is selected  
from the group consisting of tert-butyl perbenzoate, tert-butyl (methyl)perbenzoate (all isomers),  
tert-butyl (ethyl)perbenzoate (all isomers), tert-butyl (octyl)perbenzoate (all isomers), tert-butyl  
(nonyl)perbenzoate (all isomers), tert-amyl perbenzoate, tert-amyl (methyl)perbenzoate (all  
isomers), tert-amyl (ethyl)perbenzoate (all isomers), tert-amyl (octyl)perbenzoate (all isomers),  
tert-amyl (nonyl)perbenzoate (all isomers), tert-amyl (methoxy)perbenzoate (all isomers), tert-  
amyl (octyloxy)perbenzoate (all isomers), tert-amyl (nonyloxy)perbenzoate (all isomers), 2-  
ethylhexyl perbenzoate, 2-ethylhexyl (methyl)perbenzoate (all isomers), 2-ethylhexyl  
(ethyl)perbenzoate (all isomers), 2-ethylhexyl (octyl)perbenzoate (all isomers), 2-ethylhexyl  
(nonyl)perbenzoate (all isomers), 2-ethylhexyl (methoxy)perbenzoate (all isomers), 2-ethylhexyl



(ethoxy)perbenzoate (all isomers), 2-ethylhexyl (octyloxy)perbenzoate (all isomers), and 2-ethylhexyl (nonyloxy)perbenzoate (all isomers).

5. (Amended) [A]The process according to claim 1 wherein the initiator is selected from the group consisting of Bis (tertbutylmonoperoxy phthaloyl) diperoxy terephthalate, Bis (tertamylmonoperoxy phthaloyl) diperoxy terephthalate diacetyl phthaloyl diperoxide, dibenzoyl phthaloyl diperoxide, bis(4 methylbenzoyl) phthaloyl diperoxide, diacetyl terephthaloyl di peroxide, dibenzoyl terephthaloyl diperoxide, and Poly[ dioxycarbonyldioxy(1,1,4,4-tetramethyl-1,4-butanediyl)] peroxide.
6. (Amended) [A]The process according to claim 1 wherein the initiator has a 0.1 hour half life in the range 100 - 170°C.
7. (Amended) [A]The process according to claim 1 wherein the initiator is present in [the]a range of from 0.004 to 0.25 moles of initiator per kg of the polypropylene homopolymer or copolymer.
8. (Amended) [A]The process according to claim [1]7 wherein the initiator is present in the range of from 0.006 to 0.10 moles of initiator per kg of the polypropylene homopolymer or copolymer.
9. (Amended) [A]The process according to claim [1]8 wherein the initiator is present in the range of from 0.01 to 0.05 moles of initiator per kg of the polypropylene homopolymer or

copolymer.

10. (Amended) [A]The process according to claim 1 wherein there is no added monoene monomer and the initiator is selected from the group consisting of Dibenzoyl peroxide, o,o'-Bis(methylbenzoyl) peroxide, p,p'-Bis(methylbenzoyl) peroxide, o,o'-Bis(methylbenzoyl) peroxide, o,m'-Bis(methylbenzoyl) peroxide, o,p'-Bis(methylbenzoyl) peroxide, m,p'-Bis(methylbenzoyl) peroxide, Bis(ethylbenzoyl) peroxide (all isomers), Bis(propylbenzoyl) peroxide (all isomers), Bis(butylbenzoyl) peroxide (all isomers), Bis(pentylbenzoyl) peroxide (all isomers), Bis(hexylbenzoyl) peroxide (all isomers), Bis(heptylbenzoyl) peroxide (all isomers), Bis(octylbenzoyl) peroxide (all isomers), Bis(nonylbenzoyl) peroxide (all isomers), Bis(methoxybenzoyl) peroxide (all isomers), Bis(ethoxybenzoyl) peroxide (all isomers), Bis(propoxybenzoyl) peroxide (all isomers), Bis(butoxybenzoyl) peroxide (all isomers), Bis(pentoxymethylbenzoyl) peroxide (all isomers), Bis(hexyloxybenzoyl) peroxide (all isomers), Bis(heptyloxybenzoyl) peroxide (all isomers), Bis(octyloxybenzoyl) peroxide (all isomers), Bis(nonyloxybenzoyl) peroxide (all isomers), Bis(chlorobenzoyl) peroxide (all isomers), Bis(fluorobenzoyl) peroxide (all isomers), Bis(bromobenzoyl) peroxide (all isomers), Bis(dimethylbenzoyl) peroxide (all isomers), Bis(trimethylbenzoyl) peroxide (all isomers), Bis(tert-butylbenzoyl)peroxide (all isomers), Bis(di-tert-butylbenzoyl)peroxide (all isomers), Bis(tertbutoxybenzoyl)peroxide (all isomers), Bis(ditrimethylsilylbenzoyl) peroxide (all isomers), Bis(heptafluoropropylbenzoyl) peroxide (all isomers), Bis(2,4-dimethyl-6-trimethylsilyl benzoyl) peroxide and isomers tert-amyl perbenzoate, tert-amyl (methyl)perbenzoate (all isomers), tert-amyl (ethyl)perbenzoate (all isomers), tert-amyl (octyl)perbenzoate (all isomers), tert-amyl (nonyl)perbenzoate (all isomers), tert-amyl



(methoxy)perbenzoate (all isomers), tert-amyl (octyloxy)perbenzoate (all isomers), tert-amyl (nonyloxy)perbenzoate (all isomers), Bis (tert-amylmonoperoxy phthaloyl) diperoxy terephthalate, diacetyl phthaloyl diperoxide, dibenzoyl phthaloyl diperoxide, bis(4-methylbenzoyl) phthaloyl diperoxide, diacetyl terephthaloyl di peroxide and dibenzoyl terephthaloyl diperoxide.

11. (Twice Amended) [A]The process according to claim 10 wherein the initiator is selected from the group consisting of dibenzoyl peroxide, o,o'-Bis(methylbenzoyl) peroxide, p,p'-Bis(methylbenzoyl) peroxide, M,M'-Bis(methylbenzoyl) peroxide, o,m'-Bis(methylbenzoyl) peroxide, o,p'-Bis(methylbenzoyl) peroxide, and m,p'-Bis(methylbenzoyl) peroxide.

12. (Amended) [A]The process according to claim 1 wherein the initiator is used in combination with a monoene monomer.

13. (Amended) [A]The process according to claim 12 wherein the amount of monoene monomer is up to 5 times the total moles of initiator.

15. (Amended) [A]The process according to claim 12[ or claim 13] wherein the monoene monomer is styrene.

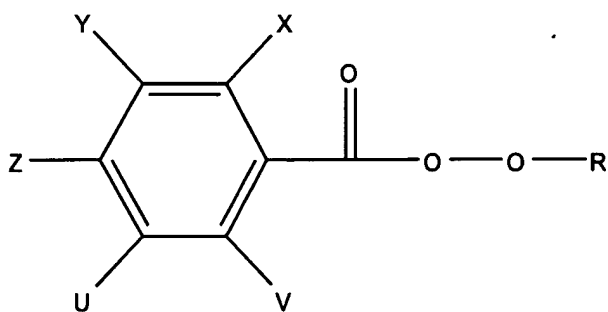
16. (Twice Amended) [A]The process according to claim 12 wherein the initiator is selected from the group consisting of Dibenzoyl peroxide, o,o'-Bis(methylbenzoyl) peroxide, p,p'-Bis(methylbenzoyl) peroxide, M,M'-Bis(methylbenzoyl) peroxide, o,m'-Bis(methylbenzoyl) peroxide, o,p'-Bis(methylbenzoyl) peroxide, m,p'-Bis(methylbenzoyl) peroxide,

Bis(ethylbenzoyl) peroxide (all isomers), Bis(propylbenzoyl) peroxide (all isomers),  
 Bis(butylbenzoyl) peroxide (all isomers), Bis(pentylbenzoyl) peroxide (all isomers),  
 Bis(hexylbenzoyl) peroxide (all isomers), Bis(heptylbenzoyl) peroxide (all isomers),  
 Bis(octylbenzoyl) peroxide (all isomers), Bis(nonylbenzoyl) peroxide (all isomers),  
 Bis(methoxybenzoyl) peroxide (all isomers), Bis(ethoxybenzoyl) peroxide (all isomers),  
 Bis(propoxybenzoyl) peroxide (all isomers), Bis(butoxybenzoyl) peroxide (all isomers),  
 Bis(pentoxymethylbenzoyl) peroxide (all isomers), Bis(hexyloxymethylbenzoyl) peroxide (all isomers),  
 Bis(heptyloxymethylbenzoyl) peroxide (all isomers), Bis(octyloxymethylbenzoyl) peroxide (all isomers),  
 Bis(nonyloxymethylbenzoyl) peroxide (all isomers), Bis(chlorobenzoyl) peroxide (all isomers),  
 Bis(fluorobenzoyl) peroxide (all isomers), Bis(bromobenzoyl) peroxide (all isomers),  
 Bis(dimethylbenzoyl) peroxide (all isomers), Bis(trimethylbenzoyl) peroxide (all isomers),  
 Bis(tert-butylbenzoyl)peroxide (all isomers), Bis(di-tert-butylbenzoyl)peroxide (all isomers),  
 Bis(tert-butoxybenzoyl)peroxide (all isomers), Bis(ditrimethylsilylbenzoyl) peroxide (all  
 isomers), Bis(heptafluoropropylbenzoyl) peroxide (all isomers), Bis(2,4-dimethyl-6-  
 trimethylsilyl benzoyl) peroxide and isomers, 2,2'(dioxydicarbonyl) bis - Benzoic acid dibutyl  
 ester, tert-butyl perbenzoate, tert-butyl (methyl)perbenzoate (all isomers), tert-butyl  
 (ethyl)perbenzoate (all isomers), tert-butyl (octyl)perbenzoate (all isomers), tert-butyl  
 (nonyl)perbenzoate (all isomers), tert-amyl perbenzoate, tert-amyl (methyl)perbenzoate (all  
 isomers), tert-amyl (ethyl)perbenzoate (all isomers), tert-amyl (octyl)perbenzoate (all isomers),  
 tert-amyl (nonyl)perbenzoate (all isomers), tert-amyl (methoxy)perbenzoate (all isomers), tert-  
 amyl (octyloxy)perbenzoate (all isomers), tert-amyl (nonyloxy)perbenzoate (all isomers), 2-  
 ethylhexyl perbenzoate, 2-ethylhexyl (methyl)perbenzoate (all isomers), 2-ethylhexyl  
 (ethyl)perbenzoate (all isomers), 2-ethylhexyl (octyl)perbenzoate (all isomers), 2-ethylhexyl



(nonyl)perbenzoate (all isomers), 2-ethylhexyl (methoxy)perbenzoate (all isomers), 2-ethylhexyl (ethoxy)perbenzoate (all isomers), 2-ethylhexyl (octyloxy)perbenzoate (all isomers), 2-ethylhexyl (nonyloxy)perbenzoate (all isomers), Bis (tertbutylmonoperoxy phthaloyl) diperoxy terephthalate, Bis (tertamylmonoperoxy phthaloyl) diperoxy terephthalate diacetyl phthaloyl diperoxide, dibenzoyl phthaloyl diperoxide, bis(4 methylbenzoyl) phthaloyl diperoxide, diacetyl terephthaloyl di peroxide, dibenzoyl terephthaloyl diperoxide and Poly[dioxycarbonyldioxy(1,1,4,4-tetramethyl-1,4-butanediyl)] peroxide.

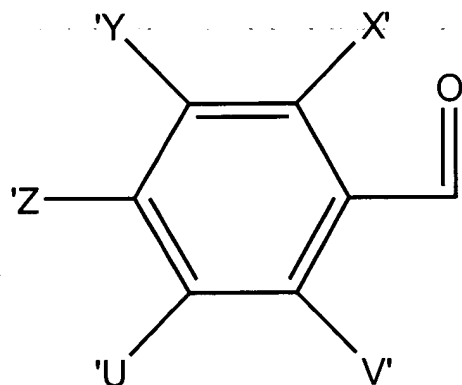
17. A modified polypropylene produced according to claim 1.
18. A process wherein the modified polypropylene of claim 17 is melt mixed with an unmodified polypropylene to produce a modified polypropylene.
19. A process for modifying an  $\alpha$ -olefin polymer wherein said process comprises melt mixing the  $\alpha$ -olefin polymer in the presence of an initiator and optionally a monoene monomer wherein said initiator is selected from the group defined by formula 1.



**Formula 1**

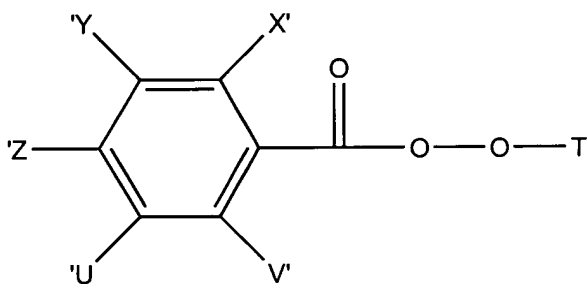
wherein R is selected from the group consisting of optionally substituted C<sub>1</sub> to C<sub>18</sub> acyl,

optionally substituted C<sub>1</sub> to C<sub>18</sub> alkyl, aroyl defined by formula 2,



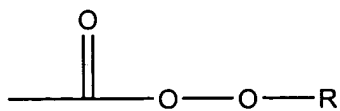
**Formula 2**

and groups of formula 3,



**Formula 3**

wherein U, V, X, Y, Z, U', V', X', Y' and Z' are independently selected from the group consisting hydrogen, halogen, C<sub>1</sub>-C<sub>18</sub> alkyl, C<sub>1</sub>-C<sub>18</sub> alkoxy, aryloxy, acyl, acyloxy, aryl, carboxy, alkoxycarbonyl, aryloxycarbonyl, trialkyl silyl, hydroxy, or a moiety of formula 4,



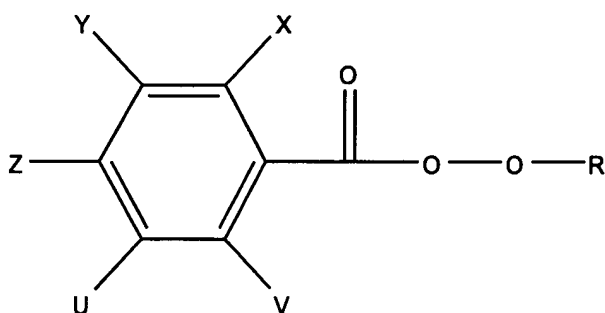
**Formula 4**



and wherein T is alkylene;

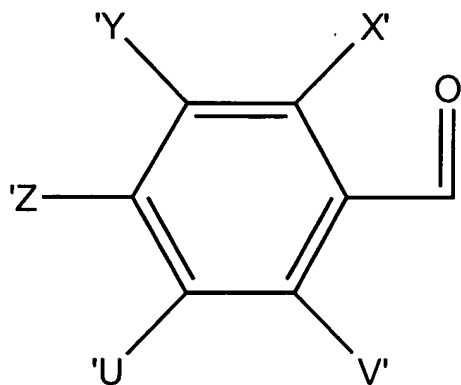
and wherein the amount of monomer is 0 to 3 times the total moles of initiator.

20. A process for increasing the melt strength and/or the extensional melt viscosity of a polypropylene (co)polymer, the process comprising melt mixing a polypropylene (co)polymer in the presence of an initiator and styrene wherein said initiator is selected from the group defined by formula 1:



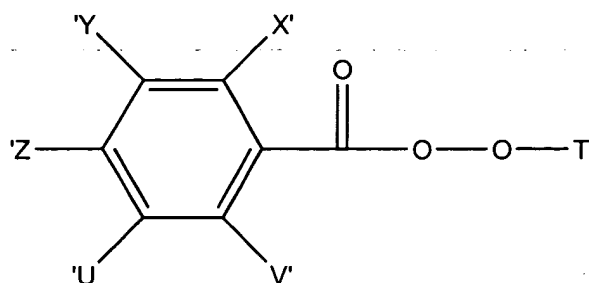
**Formula 1**

wherein R is selected from the group consisting of optionally substituted C<sub>1</sub> to C<sub>18</sub> acyl, optionally substituted C<sub>1</sub> to C<sub>18</sub> alkyl, aroyl defined by formula 2,



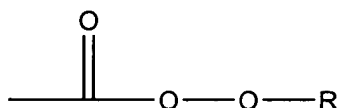
**Formula 2**

and groups of formula 3,



**Formula 3**

wherein U, V, X, Y, Z, U', V', X', Y' and Z' are independently selected from the group consisting hydrogen, halogen, C1-C18 alkyl, C1-C18 alkoxy, aryloxy, acyl, acyloxy, aryl, carboxy, alkoxycarbonyl, aryloxy, trialkyl silyl, hydroxy, or a moiety of formula 4,



**Formula 4**

and wherein T is alkylene, and where styrene is up to five times the total moles of initiator;

wherein the melt strength and/or the extensional melt viscosity of the polypropylene (co)polymer is increased during the melt mixing step.